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A SYNOPSIS OF THE EMBIIDINA OF THE UNITED STATES

EDWARD S. ROSS

California Academy of Sciences, San Francisco, California 94118.

Abstract.—The ordinal name Embiidina Hagen, 1862, is used in preference to the more recent, less appropriate name, Embioptera, Shipley, 1904. All embiids occurring in the continental United States and Hawaii are briefly treated and assigned to proper taxa. The fossil, *Embia florissantensis* Cockerell, is assigned to ***Lithembia*** new genus. The subgenus *Dactylocerca* Ross, 1940, of *Chelicerca* Ross, 1940, is elevated to generic status and a new species ***D. ashworthi*** from Arizona is described. The subgenus *Dilobocerca* Ross, 1944, of *Oligembia* Davis, 1939, is treated as a synonym of *Diradius* Friederichs, 1934, and one of its species, *caribbeanus* Ross, 1944, described from Cuba, is newly recorded from the Florida Keys. The bisexual form of *Haploembia solieri* (Rambur) is reported as a new introduction to the New World.

Although suprafamilial names of animals are not regulated by international rules, I have at last decided to follow priority and use Embiidina (Embidina *sic*) Hagen, 1862 and 1885, as the ordinal name for embiids instead of Embioptera Shipley, 1904. It should be noted that Embiidina was also used by Krauss, 1911, and Enderlein, 1912, in their world monographs. Embiidina, although not referred to as an ordinal name by Hagen, was the first suprafamilial name applied exclusively to embiids. The inappropriate name Embioptera was perhaps proposed to foster uniform ptera endings on insect ordinal names but this objective is needless and impossible to attain. In German-speaking cultures the name Embiodea Kusnezow, 1903, is in current use and thus there is no consensus on the use of the name Embioptera.

The embiids (web-spinners, or better, foot-spinners) are poorly represented in the United States and constitute only a feeble northern extension of the Order's rich Neotropical fauna. A few weed species of the Mediterranean and Asian family Oligotomidae have been introduced in human commerce.

KEY TO FAMILIES AND GENERA OF U.S. EMBIIDINA

1. Tertiary fossil from Florissant shales (Embiidae) ..... Genus *Lithembia*
– Recent species 2
2. All instars with two papillae ("bladders") on ventral surface of hind basitarsi (Oligotomidae, part) ..... Genus *Haploembia*
– All instars with only one hind basitarsal papilla 3
3. Adult males without apical mandibular dentation; segments of left cercus fused, bearing a few peg-setae (echinulations) on inner apex (Anisembiidae) 4

– Adult males with mandibles apically dentate; left cercus two segmented, inner surface of basal segment lacking peg-setae 5
4. All instars with intersegmental membranes of thorax pale, body otherwise tan or golden-brown. Mid and hind coxae of nymphs and females pale. Adult males apterous or alate, head golden; left cercus straight, with an acute, inner-apical lobe. South-central states and NE Mexico ..... Genus *Anisembia*
– Nymphs and females uniformly reddish-brown to brick-red, mid and hind coxae as dark as other leg segments. Adult males always alate, head jet-black, body extensively reddish; left cercus C-shaped, without a distinct inner lobe. Southwestern States and Mexico ..... Genus *Dactylocerca*
5. MA vein of wings (R4+5 of Comstock-Needham) forked (Teratembiidae) 6
– MA unforked (Oligotomidae, part) 7
6. Adult males with left cercus-base (left cercus-basipodite) bearing two, prominent, inner lobes; the ventral one either finger-shaped or conate ..... Genus *Diradius*
– Cercus-base with only the dorsal lobe; as in *Diradius*, this terminates in a minute bifurcation ..... Genus *Oligembia*
7. Adult males with cercus-base a complete ring bearing a prominent inner lobe. Widespread; including mainland U.S.A. and Hawaii ..... Genus *Oligotoma*
– Cercus-base obsolete except for an outer basal flange; inner lobe thus absent. Hawaii and other Pacific islands ..... Genus *Aposthonia*

Family Embiidae

Lithembia Ross, New Genus

Type-species.—*Embia florissantensis* Cockerell, by present designation.

Distribution.—Tertiary (Miocene?) fossil in volcanic ash shale, Florissant, Colorado.

Diagnosis.—The type is a large adult male with well preserved wings displaying typical embiid venation (MA forked). Abdominal terminalia represented by only a dark blotch.

Discussion.—This species is certainly not an *Embia*—a genus restricted to Africa and adjacent regions and belonging to a subfamily not represented in the New World. Its large size rules out an assignment to Teratembiidae and the wing venation is not of the anisembiid type (MA simple). Its northerly occurrence and slender body suggest that it is not a clothodid, a family confined to South America and the eastern Isthmus of Panama. It therefore seems advisable to assign it to the Embiidae which today has representation as far north as Nayarit in NW Mexico.

Lithembia florissantensis (Cockerell) New Combination

Embia florissantensis Cockerell, 1908: 230, fig. 4. Handlirsch, 1906–08: 1357.—Enderlein, 1912: 53.

Oligotoma florissantensis (Cockerell), Krauss, 1911: 48.

Clothoda florissantensis (Cockerell), Davis, 1939d: 379.—Ross, 1944: 406.

Holotype.—Alate male on rock slab in Riker Mount, Univ. of Colorado Museum, Denver. *Type data.*—Florissant Colorado Station 14, 1907 (W. P. Cockerell). Miocene.

Discussion.—All above references are based on Cockerell's original publication. To date no additional specimens have been found. The writer has studied the type and cannot add new details to the description or improve on the original published photograph.

Even if additional specimens are collected, it is doubtful if they would reveal terminalia details sufficient to add significant information concerning the systematic placement of the species.

Family Anisembiidae

Distribution.—Neotropical with limited extension into south-central and southwestern U.S.A.

In spite of the great evolutionary diversity within the family, males of all anisembiids have in common non-dentate mandibles, an unforked MA wing vein and a lack of a second basitarsal papilla.

Species of the two subfamily groups represented in the United States are able to withstand extremely cold climatic conditions—perhaps by wintering deep in soil crevices.

Genus *Anisembia* Krauss

Anisembia Krauss, 1911: 74.—Enderlein, 1912: 109 (in error as a syn. of *Oligotoma* Westwood and *Haploembia* Verhoeff).—Chamberlin, 1923: 346.—Davis, 1940: 531.—Ross, 1940: 649; 1944: 445.

Type-species.—*Embia texana* Melander, 1902, by original designation.

Distribution.—Lower Mississippi Valley, western Oklahoma, southward through eastern Texas to Victoria, Mexico.

This genus is here restricted to its type-species and one or more closely related species or subspecies occurring in NE Mexico at least as far south as Victoria.

Anisembia texana (Melander)

Embia texana Melander, 1902: 99, figs. 1, 2.—Friederichs, 1906: 238.

Anisembia texana (Melander) Krauss, 1911: 74, fig. F.—Chamberlin, 1923: 345.—Davis, 1940: 532.—Sanderson, 1941: 60 (record).—Shetlar, 1973: 205 (parasitoid).

Oligotoma texana (Melander) Enderlein, 1912: 92, 109, fig. 62.—Mills, 1932: 648, figs. 1–4.

Anisembia (*Anisembia*) *texana* (Melander) Ross, 1940: 650, figs. 20–22, 28; 1944: 445.

Diagnosis.—All nymphal stages and adults can be distinguished from other U.S. embiids by the pale intersegmental thoracic membranes. These are more evident as other body surfaces darken with maturity. Nymphs and adult females have pale coxae. Males have many distinctive features and in some regions may be invariably winged, in others winged or apterous, and in still others always apterous. Apterism appears to be more frequent, even universal, in more arid regions.

Anisembia texana was described from specimens collected under stones at

Austin, Texas in 1902. Since that time additional collecting indicates extensive habitat and geographic ranges. The species has been recorded from as far south as the Rio Grande River whence it extends south into Mexico, and as far north as southwestern Oklahoma and southern Arkansas and east to Vicksburg, Mississippi. In the more arid, hot, southwestern extremes of range, the species evades heat and dryness under stones and in soil cracks or under loose bark in shaded areas. Progressing northeast with the increasing rains of shaded hardwood forests, it adopts the less protected surface of the bark of trees and uses only superficial bark cracks as retreats.

It was thus collected at Texarkana, Texas, and at Monroe, Louisiana. In the latter locality, it was found to be very common on the shaded side of the larger shade trees (mostly oaks) bordering the city streets. As many as 50 separate colonies were observed on a single tree extending from the base to a considerable height. During mid-August each colony contained a single female and her brood of first and second instar young. No males were observed. Usually the only retreat was a slightly deeper bark crack from which radiated outward a system of galleries among the moss and lichens which comprise the food supply. Only alate males developed from these broods.

In the Wichita Mountains of SW Oklahoma, *texana* is very abundant on arid, south-facing slopes. Extensive galleries extend up the sides of stones from subterranean retreats. Only apterous males occur at this locality.

Genus *Dactylocerca* Ross, New Status

Anisembia (*Dactylocerca*) Ross, 1940b: 659.
Chelicerca (*Dactylocerca*) Ross, 1944: 454; 1957: 52.

Type-species.—*Anisembia* (*Dactylocerca*) *rubra* Ross, 1940, by original designation.

Distribution.—Mexican highlands northward into southwestern United States.

Diagnosis.—Males small, alate; jet-black to brown, but with prothorax and subterminal abdominal segments reddish. Head and mandibles small. Wings always present; small, slender. Terminalia exceptionally large—much larger than head; right hemitergite (10R) broadly-rounded caudally, bearing only an indefinite process represented only as a small, acute point (10RP) on right caudal arc; epiproct (EP) complex, heavily sclerotized, usually armed with basad-recurved spicules; hypandrium process (HP) expanded and arcuated caudally, its dorsal surface specially sclerotized, its membranous areas coarsely spiculate; left cercus without trace of a terminal segment, greatly elongated, tubular in shape, strongly arcuated or almost straight, inner apex bearing a few peg-setae.

Females small, slender; uniformly reddish in color.

Remarks.—*Dactylocerca* represents the greatest degree of anatomical complexity on the *Chelicerca* line. *Dactylocerca rubra* (Ross) is one of the most north-ranging, cold-enduring species of the order. It ranges over a wide area from central Utah and New Mexico to northwestern Baja California without apparent subspeciation. Its preferred habitat is juniper piñon pine zones. I have recently decided that populations occurring in southwestern Arizona and adjacent regions of northern Mexico represent a new species. Several undescribed additional species occur on the Mexican Plateau, at least as far south as the Lago Chapala region.

Dactylocerca rubra (Ross) New Combination
(Figs. 1–2

Anisembia (*Dactylocerca*) *rubra* Ross, 1940: 659, figs. 35–37.
Chelicerca (*Dactylocerca*) *rubra* (Ross), 1944: 454; 1957: 52, fig. 3.

Distribution.—Mexico: NW Baja California, from coast to foothills of Sierra San Pedro Martir. California: from SW coast throughout S California mountains up to approximately 5000 ft level as far north as Tehachapi Mountains. Nevada: Yucca Flats, Nye Co. Utah: Dugway, Filmore and La Verkin. Arizona: Oracle (N side Santa Catalina Mts.); White Mts., 50 mi. S of Alpine in juniper zone. New Mexico: Winter Park, just W of Cloudcroft, Sacramento Mts., juniper-piñon zone.

This distinctive species may be recognized by reference to the accompanying figures. Its colonies occur under stones but these may actually be more generally distributed in the sod of grassy habitats. Rubra's rich pigmentation, and that of the following new species, suggest that males disperse diurnally.

Dactylocerca ashworthi Ross, New Species
Figs. 3–4

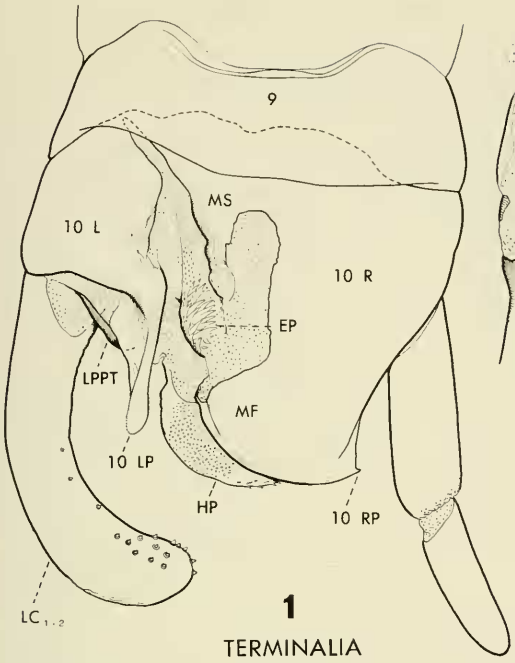
Holotype.—Male, on slide, deposited in the California Academy of Sciences, San Francisco. *Type data:* Arizona: Ridge S of Parker Cyn., W side of Huachuca Mts., Santa Cruz Co., 5600 ft, matured in culture May 3, 1977 (E. S. Ross).

Description.—Appearance: Similar to *rubra* but slightly darker overall; small, alate, black to dark brown except in the membranous and weakly sclerotized areas which are salmon-red. Color details (in alcohol): Cranium uniformly black, shining in spite of alutaceous surface. Eyes pink, lacking dark facet-interstices. Antennae blackish basally, brown distad, all membranes pink; 17-segmented, complete. Mouthparts dark brown. Thorax largely salmon-red except for dark brown scuta, pleurites and sternites of pterothorax; prothoracic and cervical sclerites dark brown; pronotum dark brown medially, blending to salmon-red laterally and in caudal angles. Legs uniformly dark brown except for pink membranes of basitarsus of forelegs. Wing bands medium brown; hyaline stripes narrow, sharply defined; costa and radius borders pink, the latter merging with costa well before wing apex. Abdomen salmon-red except for black terminalia sclerites. Dimensions (on slide): body length 6.5 mm; forewing length 3.5 mm, breadth 0.7 mm.

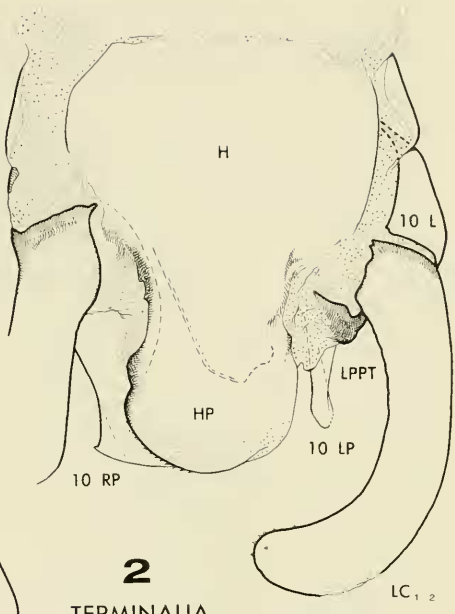
Important anatomical features: very similar to *rubra* except for terminalia, as follows: caudal arc of right hemitergite only half as long as in *rubra*; right process (10RP) larger than in *rubra*—a definite arcuated hook. Hypandrium process (HP) much narrower than in *rubra*. Left cercus (LC1+2) abruptly curved inward, instead of being evenly arcuated as in *rubra*; its apex bulbous.

→

Figs. 1–4. Figs. 1–2. Abdominal terminalia of *Dactylocerca rubra* holotype. Figs. 3–4. Same for *Dactylocerca ashworthi* holotype. Not to scale, stippling represents membranous areas; setae omitted, except for peg-setae (echinulations) of left cercus. Explanation of symbols: 9 = ninth abdominal tergite, 10L and 10R = hemitergites of tenth segment, 10LP and 10RP = processes of these hemitergites; MS = medial sclerite of 10; EP = epiproct (segment 11); H = hypandrium (sternite 9), HP = process of H; LPPT = left paraproct; LC1+2 = composite left cercus.



1
TERMINALIA
DORSAL



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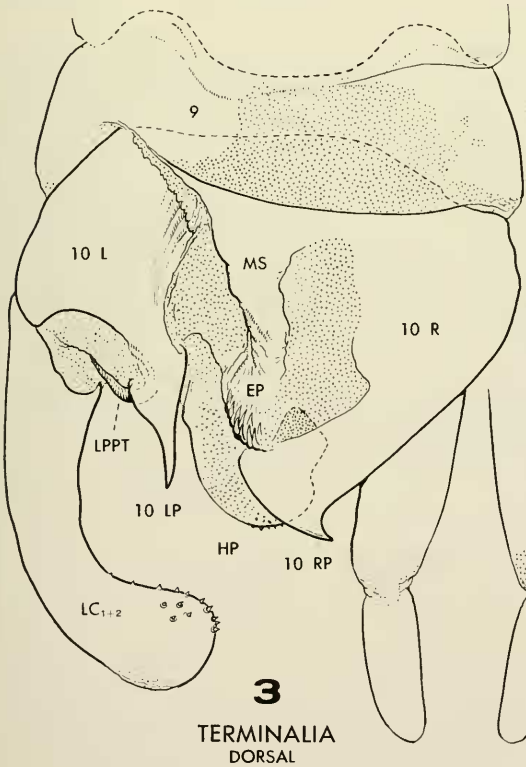

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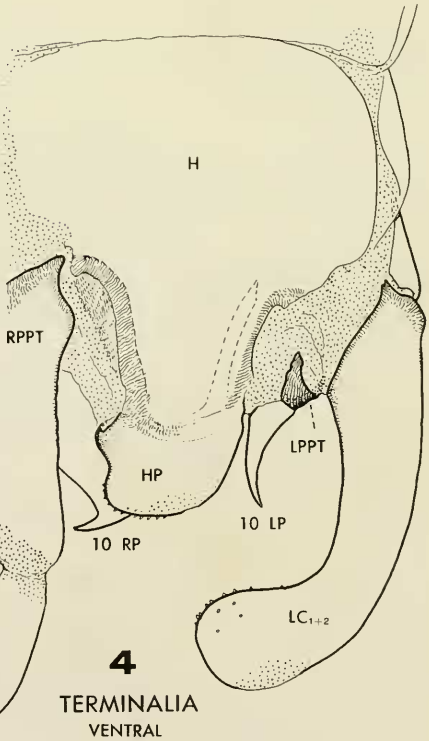

4
TERMINALIA
VENTRAL

Allotype.—Female with type data and disposition. Uniformly reddish in color. Without apparent specific characters.

Paratypes.—Numerous topotypic adults to be deposited in major entomological museums.

Other specimens studied (except as indicated, all are in writer's collection, C.A.S.).—Arizona: Patagonia, Santa Cruz Co., matured in cultures during I, II, V, VIII, and IX, 1976 (E. S. Ross); Nogales, Santa Cruz Co., VIII-30-27 (J. C. Bradley); 6 mi NW of Nogales, VIII-16-50 (R. S. Beal); Pena Blanca, Atacosa Mts., Santa Cruz Co., 4000 ft, matured in cultures IX and X, 1976 (E. S. Ross); Santa Rita Mts., VI-21-36 (R. A. Flock). Mexico: 17 mi E Imuris, Sonora, 3800 ft, matured in culture XII-28-76, I-26-77 and VI-77 (E. S. Ross).

In addition to the above samples which are very similar to those of the type series, I have specimens from the southeastern portion of Cochise County, Arizona which are somewhat distinct, as follows: the caudal arc of 10R is longer; the hypandrium process (HP) is broader and has a small, fleshy, microspiculate lobe on the dorso-caudal angle and the left process (LC1+2) is less bulbous yet more abruptly curved inward than in *rubra*. Records of this variant are: Chiricahua R.R. Station (now abandoned), Cochise Co., open, grassy hillside, under stones after rains, males matured in culture III-65 (E. S. Ross, also P. H. Arnaud); 5 mi SW of Apache, Cochise Co., 4400 ft, males matured XII-15-60 (E. S. Ross); Cave Creek, Chiricahua Mts. (W of Portal), VII-4-40 (R. H. Beamer) (U. of Kansas); SW Research Station (W of Portal), IX-29-58 (H. V. Weems) (State Plant Board of Florida).

Discussion.—*Dactylocerca ashworthi* apparently is confined to mountainous habitats just north of the Mexican boundary in SE Arizona and thence occurs southward into Sonora. Strangely, *rubra* occurs in the nearby Santa Catalina and White Mountains, as well as far to the east in the Sacramento Mts. of New Mexico, in addition to its widespread occurrence in other regions of southwestern U.S.A.

Its habits are similar to those of *rubra*, colonies being most readily encountered beneath the edges of stones. Each colony consists of a single female and her brood with reproductive activity stimulated by the first rains of the summer season. Males, which mature mostly during September and October, disperse diurnally and thus may be collected by sweeping. They never fly to light.

Very often colonies are found under stones resting on litter beneath trees but at the type locality, and in the Apache region, the species occurs in treeless habitats—open grasslands with an abundance of stones.

This species named after Clifford Ashworth in recognition of his important support of scientific research.

Family Teratembiidae

This large family of delicate, small species is primarily Neotropical and Afrotropical, with a small representation in tropical Asia. The name is based on *Teratembia geniculata* Krauss, 1911, which was long known only from its unique, poorly-described type collected in Tucuman, Argentina. The writer has collected additional specimens and determined (1952) that the family name Oligembiidae, Davis 1940, is synonymous.

Five species of the widespread genera *Oligembia* Davis, and *Diradius* Friederichs occur within the United States and are keyed as follows:

KEY TO U.S. GENERA AND SPECIES OF TERATEMBIIDAE (MALES)

1. Left cercus-basipodite (LCB) with two, prominent inner lobes, or processes; the upper minutely furcated, the lower acutely pointed, or finely tapered. Right hemitergite (10R) with outer margin long, as long as tergal length; without furrow representing line of fusion with composite left hemitergite and medial sclerite (10L + MS). *Diradius* 3
– Left cercus-basipodite with only the upper, furcated lobe. Right hemitergite very small, short-sided; weakly defined by a shallow, diagonal furrow. *Oligembia* 2
2. Color pale, head golden, Florida, Bimini and Bahamas ..... *hubbardi*
– Uniformly blackish. S Louisiana, SE Texas, NE Mexico ..... *melanura*
3. Submentum with a lobe at each anterior angle; incisor arc of right mandible with a small but distinct, acute tooth. SE U.S.A. ..... *vandykei*
– Anterior angles of submentum unlobed; incisor arc without a tooth 4
4. Lower lobe of left cercus-basipodite short, blunt. SE Texas, NE Mexico ..... *lobatus*
– Lower lobe of left cercus-basipodite long, narrowly tapered to a fine point. S Florida, Cuba ..... *caribbeanus*

Genus *Oligembia* Davis

Oligembia Davis, 1939: 217.—Ross, 1940: 636; 1944: 459; 1952: 226.

Type-species.—*Oligotoma hubbardi* Hagen, by original designation.

Distribution.—SE United States, southward throughout the Neotropical region. Absent in Old World.

Oligembia hubbardi (Hagen)

Oligotoma hubbardi Hagen, 1885: 152.—Schwarz, 1888: 94 (biol.).—Krauss, 1911: 44.—Enderlein, 1912: 91.

Embia (*Oligotoma*) *hubbardi* (Hagen) Melander, 1902: 21.

Oligembia hubbardi (Hagen) Davis, 1939: 218.—Ross, 1940: 637, figs. 5–7; 1944: 462, figs. 98–100.

Holotype.—Male, on slide, Museum of Comparative Zoology, Cambridge, Mass. *Type data:* Enterprise, Fla., May 24 (H. G. Hubbard).

Distribution.—Florida, including the Keys, S Bimini, and Bahamas.

This species occurs in bark flakes and crevices in many Florida localities and the pale males frequently fly to lights. Males of similar-appearing *Diradius vandykei* may easily be distinguished by the anterior lobes of the submentum, the attenuated second (lower) inner lobe of the left cercus-basipodite. *Diradius caribbeanus* also has the latter distinction.

Oligembia melanura Ross

Oligembia melanura Ross, 1944: 470, figs. 118–120: 499.

Holotype.—Male, on slide, deposited in the National Museum of Natural History, Washington, D.C. *Type data:* New Braunfels, Texas, Aug. 20, 1942 (E. S. Ross).

Distribution.—Probably throughout the Gulf Coast lowlands from New Orleans through post oak zone of Texas and southward into Mexico.

Adults of *melanura* are readily recognized by their blackish appearance. Colonies are found beneath bark flakes of many types of trees in very distinct habitats. Just north of New Orleans the writer frequently found colonies in bald cypress bark in swamps and that of oaks bordering streets within the city of New Orleans. It is doubtful if the species occurs in mesquite-cactus habitats of Texas. It, and close relatives, are found in many Mexican localities. In the central highlands, colonies are encountered beneath stones.

Genus *Diradius* Friederichs

Diradius Friederichs, 1934: 419.—Davis, 1940: 528.—Ross, 1944: 493.
Oligembia (*Dilobocerca*) Ross, 1944: 476 (type species: *Oligembia* (*Dilobocerca*) *lobata* Ross, by orig. designation). New Synonym.

Type-species.—*Diradius pusillus* Friederichs.

Distribution.—Neotropical and West African.

During 1964 the writer collected and studied topotypic specimens of the type species in SE Brazil and determined that the holotype of *pusillus* has anomalous wing venation and that the subgenus *Dilobocerca* Ross, of *Oligembia,* is synonymous. Based on knowledge of many new species, it is now concluded that *Diradius* deserves full generic status.

Diradius lobatus (Ross), New Combination

Oligembia (*Dilobocerca*) *lobata* Ross, 1944: 477, figs. 127–129.

Holotype.—Male, on slide, deposited in the National Museum of Natural History, Washington, D.C. *Type data:* Texas: Palm Grove, Brownsville, Sept. 29, 1942 (E. S. Ross).

Males of this species are readily distinguished from the two other U.S. *Diradius* by the shorter and blunter lower lobe of the left cercus-basipodite, as well as numerous other characters. It is the most northerly of a large, difficult complex of species and/or races which occur throughout lowland Mexico, Central America, and N South America. Its colonies were found in bark crevices of trees and dead stumps. Perhaps its U.S. occurrence is limited to the "tropical" habitats near the mouth of the Rio Grande.

Diradius caribbeanus (Ross) New Combination

Oligembia (*Dilobocerca*) *caribbeana* Ross, 1944: 492, figs. 154–156.

Holotype.—Male, on slide, deposited in the National Museum of Natural History, Washington, D.C. *Type data:* Cuba: Cayamas, Santa Clara, on dead vines, March 11, 1911 (E. A. Schwarz).

This species has recently been collected on the Florida Keys (Crane Keys, Johnston Key, Galdin Key, Mud Keys, Squirrel Key, Whiting Key, Rattlesnake Lumps and Inner Narrows) during June–August, 1969–70 by Drs. E. O. Wilson, D. Simberloff and S. Peck. Mixed in the various lots were specimens of *Oligembia hubbardi* and *Diradius vandykei.* It is likely that these species are blown about in hurricanes in silk-secured colonies in crevices of small dead branches and other debris.

From *vandykei,* which also has an attenuated lower left cercus-basipodite lobe, *caribbeanus* is easily distinguished by an absence of lobes on the anterior angles of the submentum of adult males.

Diradius vandykei (Ross), New Combination

Oligembia (*Dilobocerca*) *vandykei* Ross, 1944, p. 488, figs. 151–153.

Holotype.—Male, on slide, deposited in the National Museum of Natural History, Washington, D.C. *Type data.*—Florida: 5 mi. NE Pensacola, shores of Escambia Bay, matured in culture III-10-43 (E. S. Ross).

Distribution.—Gulf Coast Plain (prob. from S Mississippi to Florida): Florida, incl. Keys; coastal plains and lower Piedmont of Georgia, S. Carolina, N. Carolina and SE Virginia.

Males of this very distinct species are readily distinguished by the presence of a medial tooth in the incisor arc of the right mandible, and the broad submentum with a lobe at each anterior angle. There are other distinctions in the mandibles and terminalia.

Colonies are obscure, but common, in bark flakes of trees—most noticeably on the trunks of shade trees in small towns. Specimens from the Florida Keys are smaller and paler than those from northern localities which tend to have a two-tone cranium—the caudal half brown, the anterior golden-brown. It is possible that future studies will reveal the existence of races.

Family Oligotomidae

Except for the genus *Haploembia* of the Mediterranean region, oligotomids are endemic to Asia and Australia. Several species, however, even within the family's region of endemicity, are "weeds" distributed in human commerce. Four species of the family are now established within the United States.

Oligotoma saundersii (Westwood)

This is the most widespread species of the order and is likely to be found in any warm region of the world, especially in and around human settlements. Males frequently are attracted to light. It is very common in Florida and Texas and may occur, particularly near port cities, along the entire Gulf coast. It should eventually establish itself in other warm habitats, such as California. It is the most common species in Hawaii.

Males are readily recognized by their oligotomid wing venation (MA unforked), dentate mandibles, sclerotic submentum; the broad spatulate left tergal process (10LP), and the sickle-shaped horizontal hook beneath the apex of the hypandrium lobe (HP).

Oligotoma nigra (Hagen)

Oligotoma nigra is very common in the Middle East, Pakistan and northern India (the endemic center of *Oligotoma*). Perhaps during the 1880's it was accidentally introduced into the USA in date palm cuttings and has since become very common in southern California, southern Utah (Zion Natl. Pk.), Arizona, perhaps New Mexico, and it has recently appeared in the San Antonio region of Texas. Like *saundersii, nigra* should steadily increase its range, especially in semi-arid regions. Males commonly fly to lights.

Males are very similar to those of *saundersii* but distinguished by the slender left tergal process and talon-like ventrally directed hook on the left side of the apex of the hypandrium process.

Aposthonia oceania (Ross)

Oligotoma (*Aposthonia*) *oceania* Ross, 1951, p. 307, fig. 1. (Holotype, Bishop Mus., Fatu Hiva, Marquesas Islands).

This species, which is related to SE Asian species, apparently was brought to many islands of the Pacific, including Easter Island and New Caledonia during the ancient movements of Polynesians. It perhaps occurs on all of the Hawaiian islands, including the small, remnant islands of the northwest. The writer found the species exceptionally common in rather dry trail bank crevices in Oahu's Aeia Heights (State Park) above Pearl Harbor. D. E. Hardy collected the species at Kainalu, Molokai, 1500–2000 ft, under lichens and moss on scrubby ohia lehua (*Metrosideros collina*) IV-9-63. It should be noted, however, that embiids never have specific associations with host plants.

From the only other Hawaiian embiid, *O. saundersii*, males of *oceania* can be distinguished by the lack of a complete, ring-like, left cercus-basipodite and absence of large, horizontal, sickle-shaped process beneath the apex of the hypandrium lobe.

Haploembia solieri (Rambur)

This Mediterranean species, more fully treated in Ross (1957, 1966), was long ago introduced into California where it is now exceedingly common under stones, particularly in oak-grass habitats. It has spread into southern Oregon (Grants Pass), southern Utah (St. George), Arizona, and Texas (Kimble Co. and Alpine). All such populations are parthenogenetic, as are those of North Africa and many adjacent European regions.

Recently, however, a bisexual population (typical *solieri*) was discovered in Redwood City, California and its spread has not yet been determined. I believe that this is a new introduction from the Mediterranean region. It is possible that the parthenogenetic form is a distinct species for it is more lightly pigmented, has egg-form distinctions, and no sexual relationships with males of typical *solieri*.

All instars of *Haploembia* can be distinguished from all other U.S. embiids by the presence of a second (medial) ventral papilla on the hind basitarsus.

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